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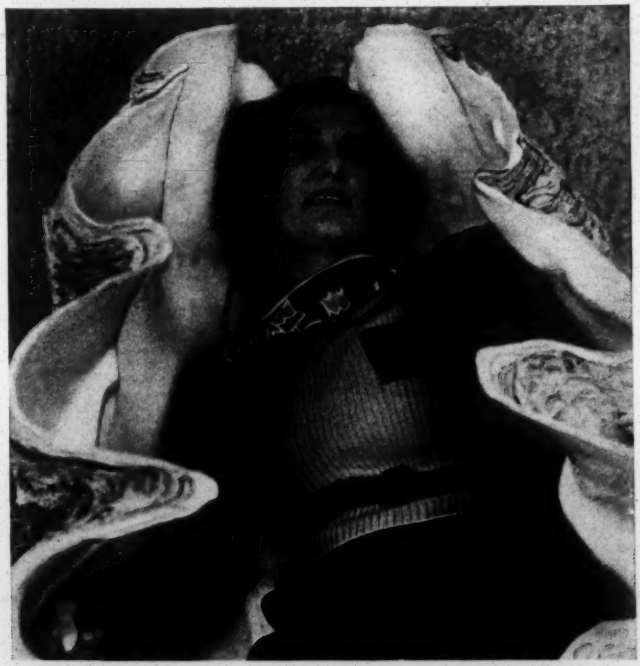

Photograph by T. C. Roughley

AUSTRALIA'S WOMAN-SIZE CLAM IS THE WORLD'S LARGEST

This lady-on-the-half-shell shows the size of the giant clams, which attain a length of four and a half feet and a weight of 500 pounds. The clam opens and closes the two halves of his shell with a muscle as large as a man's arm and stronger. Half a clam shell makes a perfect basin for catching and storing rain water for inhabitants of the Great Barrier Reef around Australia's northeast coast (Bulletin No. 5).

HOW TEACHERS MAY OBTAIN THE BULLETINS

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Russia's Ace-in-the-Hole Capitals

KUIBYSHEV, RUSSIAN WAR CAPITAL ON THE VOLGA

KUIBYSHEV (formerly Samara) was the destination to which American newspapermen, a trainload of foreign diplomats, and some departments of the Russian government moved from embattled Moscow. It is more than 500 miles southeast of Russia's peacetime capital.

Situated on one of the deep loops of the winding Volga River, Kuibyshev is the site of a huge hydroelectric power project consisting of two power stations, which, when completed, will be able to supply the entire upper Volga basin.

The city has an important share in the development of the Volga-Ural region as a new oil district, which Soviet officials say is to be "second to Baku." The city's population was 390,000 in 1939.

Kuibyshev, with its favorable location on early trade routes, long has been important commercially. It is one of Russia's leading grain, cattle, and dairy markets (illustration, next page). Its industries, which once consisted chiefly of small flour mills and food-processing factories, now include large-scale flour-milling operations and some heavy industries.

As Samara, the Volga city was founded in 1586 and fortified against early nomadic tribes of the vast steppe regions of central Russia. Its first inhabitants were mostly the hard-riding, hard-fighting Cossacks.

It was considered a backward provincial city as late as the mid-19th century, when it served as a place of exile for political prisoners.

KAZAN, RUSSIA'S TATAR CAPITAL

REMOVAL of the Russian government from besieged Moscow, with the determination to continue fighting, was foreshadowed last summer by the transfer of part of the U. S. diplomatic staff to Kazan, 450 miles east of Moscow.

This 500-year-old city, with onion-shaped domes of Moslem mosques and minarets marking its skyline, is a center of commerce in the Volga's agricultural basin and a traffic crossroads of eastern European Russia. Near Kazan the Trans-Siberian Railway from Moscow, the world's longest rail line, crosses the Volga, Europe's longest river. In peacetime Kazan is a regular stop on the air route between Moscow and Siberia.

Now sixteenth in size among the cities of the Soviet Union, with a population above 400,000, Kazan is capital of the Tatar Autonomous Soviet Socialist Republic. This is one of several self-governing republics in the Volga basin, such as the adjoining ones of the Bashkirs on the east, the Marii on the southeast, the Chuvash on the southwest, and the Udmurts on the north, where formerly subject races have their own government units according to Soviet plan. The Tatar Republic, nearly as large as Maine, lies on the windswept steppes of little rain, where northern forests thin out into grazing land and farms.

Kazan was founded by heirs of Genghis Khan and the Golden Horde, the 15th-century Kipchak Tatars who invaded Russia from Asia. Exasperated with the Tatars' demands for tribute, Ivan the Terrible captured the city for Russia in 1552, blowing up the subterranean passageway through which the besieged Tatars obtained their water supply. Thereafter Tatar craftsmen made Kazan famous for their "Russian leather," and toiling Volga boatmen helped make the Kazan fair an international market for the wares of Persia and Turkestan.

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Photograph by Loran Kahle

PICKING COCONUTS, ONCE MONKEY'S BUSINESS, NOW IS WAR BUSINESS

This coconut palm was photographed in Venezuela on the lawn of a home in one of the new "oil towns" that spring up wherever oil wells are drilled, even in the jungle (Bulletin No. 2). The native waving his hand from above the cluster of coconuts is picking orchids, a more profitable business in the Western Hemisphere than collecting coconuts. But in the East, coconuts support an organized industry, in which monkeys are sometimes employed to climb the palm trees and pick the nuts. In peace times the outer husk (visible in the picture) furnishes a fiber, the sweet white meat provides a food and a useful oil, and the hard shell is thrown away. But in war times the shell is a source of charcoal for gas masks (Bulletin No. 5).

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Venezuela and U. S. Gasoline

DISCUSSION of oil shortage in the East has called attention to the fact that the United States, though the leading oil-producing nation in the world, has for years been importing millions of barrels of petroleum annually, with Venezuela the principal source.

More than 30,000,000 barrels were imported from Venezuela into the United States in 1940. Figures for 1941 so far indicate still larger imports, averaging about three million barrels a month.

Ranks Third in World's Oil Output

Venezuela ranks third in world petroleum production, having risen to this rank in a few years and now standing next to the U.S.S.R. Twenty years ago, Venezuelan oil wells yielded less than half a million barrels; four years ago, their output exceeded 185,000,000 barrels, an increase of almost 4,000 per cent. A third of the 3,000 wells flow naturally. Today petroleum is responsible for between 75 and 90 per cent of Venezuela's exports, mostly in the form of crude oil, returning some $150,000,000 to producers.

Most of the Venezuelan oil fields are in the hands of foreign companies, notably those of the United States, Great Britain, and The Netherlands. Their royalties of 12½ per cent paid to the Venezuelan government are said to cover half the national budget. Their estimated investment now is about $500,000,000.

About three-fourths of Venezuela's oil comes from the northwest corner of the country, in the region of Lake Maracaibo, twice the size of Lake Ontario. This oil field has been called the largest in the world. So rich is it that wells have been sunk in the bottom of the lake, some in 50 feet of water.

Jungles Opened Up in Search for Oil

A new eastern field has been developed more recently in the Orinoco River valley. American companies alone are reported to have leased over 3,000 square miles of this territory in one year, creating new towns such as Quiriquire (illustration, next page). A sixteen-inch pipeline, one hundred miles long, has been laid to bring oil out of this area.

One estimate lists 27,000 square miles out of Venezuela's total area of 352,000 square miles as having enough petroleum to make oil wells profitable.

Oil development has been responsible for opening up much of Venezuela in recent years. Roads and even whole towns, complete with sewage systems, gas and electric plants, hospitals and schools, have been built in the jungle.

Total imports of crude petroleum and refined products into the United States from all countries last year amounted to 82,916,000 barrels. This was an increase of 23,856,000 barrels over 1939 import figures. The increase has been ascribed partly to Uncle Sam's "Good Neighbor" Trade Agreement with Venezuela, which became effective towards the close of 1939. But the United States still produces more than 15 times as much oil as is imported from foreign wells.

U. S. imports of Venezuelan oil have increased too because producing wells owned by United States interests are relatively near the large consuming area on North America's east coast. Also, Venezuelan oil is a heavy petroleum suitable for industrial fuel and for asphalt, and is less costly than the same grades of U. S. oil.

Curiously enough, most Venezuelan oil reaches the United States from the

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Later Russian rulers used this eastern outpost as a base for conquering and colonizing the rest of eastern Europe and pushing into Siberia, though the only Russians venturing into the Tatar regions for a time were soldiers and monks.

The Czechoslovak Legion that patrolled the Trans-Siberian Railway during its unique World War campaign held Kazan for nearly a month in 1918.

Since the beginning of the Tatar Autonomous Republic in 1920, Kazan has been a center of Tatar culture, with a museum, a university, and a theater for the Tatars especially. There is only one Kazan newspaper published in Russian, while there are two in Tatar dialects. Tatar women have discarded the Moslem veil for the white coats of students at the Kazan Medical School. Most of the Tatar doctors are women. At the Ulianov-Lenin University, both Tolstoi and Lenin studied.

To Kazan's traditional Russian leather industry have been added factories turning out typewriters and motion picture film, and an important unit of the Soviet Union's artificial rubber manufacture, using alcohol from potatoes. From the northeastern forests come furs for processing, a large portion of Russia's total output. Felt boots of Kazan manufacture are in demand for winter wear, especially when January temperatures average six degrees above zero. Dairying in the Republic supplies materials for Kazan's condensed milk factory.

Note: The National Geographic Society's Map of Europe and the Near East, published in May, 1940, shows Kuibyshev (Samara) and Kazan in their strategic positions on the Volga, midway between Moscow and the Urals. A price list for this and other maps may be obtained at the Society's headquarters in Washington, D. C.

See also: "Russia of the Hour," in the *National Geographic Magazine*, November, 1926, and the following GEOGRAPHIC SCHOOL BULLETINS: "Soviet Union, Giant Among Nations," October 6, 1941, and "The Big Four of Russia's Beleaguered Cities," October 20, 1941.

Bulletin No. 1, November 10, 1941.

Photograph by Maynard Owen Williams

KUIBYSHEV STEPPED FROM CAMEL POWER TO ELECTRIC POWER IN ONE GENERATION

As electric horsepower increases in Kuibyshev (Samara), fewer draught animals are seen pulling wooden carts of hay or vegetables to the weekly market in the public square before one of Kuibyshev's largest churches. People in the crowd have turned to stare at the strange procession of a horse-drawn cart accompanied by a colt, and a camel-drawn cart following. The camel that gives Kuibyshev an Oriental air is a hold-over from the city's early days as a caravan junction.

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Nile Delta Is Egypt's Mediterranean Doormat

"WE ARE lying back on our fertile delta, which incidentally is the worst ground in the world for armored vehicles," Winston Churchill has said. And because of the Nile Delta's many obstacles to wheeled progress, as well as its frontage on the embattled Mediterranean, Egypt is getting a new trade route.

From the time when the science of navigation was born on eastern Mediterranean shores, sea trade with Egypt has funneled into the fertile Nile Delta as into a cornucopia—and out of it as well. Fleets of Greek galleys swarmed down on the delta from the north before Alexander the Great founded Alexandria in 332 B.C. The world's first lighthouse rose outside this port to safeguard early ship routes fanning out from the delta to other Mediterranean centers.

Now Egypt's delta horn of plenty has a new trade route approaching it overland on the southeast. American trucks and tanks, crossing the Atlantic and rounding Cape Horn to Africa's east coast, avoid Mediterranean hazards by being unloaded at small Red Sea ports near Suez, then cutting across the sands to Cairo on the first lap of their journey to the Egyptian-Libian front.

Winston Churchill "Was There"

By crossing Egypt at Cairo, the vehicles touch the delta only at its southern tip. The valley of the lower Nile—in striking contrast to the barren desert that frames it on either side—is a narrow, green ribbon of fertility cutting through northeastern Egypt. From Cairo, about 100 air miles south of the Mediterranean, the delta spreads into a productive triangle nearly 150 miles wide at the coast.

The Nile is known to Mr. Churchill from personal experience there with the British Army during the Sudan campaign of 1898 against the Dervishes. In his two-volume work, *The River War*, he writes: "There is life only by the Nile. If a man were to leave the river, he might journey westward and find no human habitation . . . except the lonely tent of a Kabbabish Arab or the encampment of a trader's caravan. . . . Or he might go east and find nothing but sand and sea and sun until Bombay rose above the horizon. . . . It (the river) is the means by which we fight. . . . It glitters between the palm-trees during the actions. . . ."

Rivers No Longer Reach the Sea

In the delta, two main channels of the Nile cut the soft, fertile soil—the Rosetta, flowing northwest to a point near Alexandria, and the Damietta, flowing northeast to the sea 30 miles west of Port Said at the Suez Canal entrance.

Other river channels also flow through the alluvial plain. Once these streams were many mouths through which the Nile joined the Mediterranean. Today, because of flood control measures upstream, and their use in local irrigation, they are "false mouths," often stagnant, that no longer reach the sea even at flood time.

All these waterways, and their extensions through irrigation ditches (illustration, next page), offer obstacles to any mechanized army attempting to cross the delta. Another problem is the fact that the land is cut up into innumerable tiny farms. About 60 per cent of Egypt's farmers cultivate less than one acre each.

The Nile flood season, beginning much earlier, is not felt in the lower river until July. It reaches its maximum at Cairo in October. This annual flood tide, which has its origin far to the south in the Ethiopian highlands, has been the life-blood of Egypt since people began to live by the river banks.

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Netherlands West Indies, where the little island of Aruba processes the oil in one of the two largest refineries in the world.

Note: Consult the National Geographic Society's Map of South America for Venezuela's position on the continent. With a unique projection which reduces distortion, the map shows river routes, railways, chief natural resources, scenic and historic features. An inset gives airways and relief. A price list for this and other maps of the Society may be obtained from the Society's headquarters in Washington, D. C.

See also these articles in the *National Geographic Magazine:* "Caracas, Cradle of the Liberator," April, 1940, and "Modern Venezuelan Vignettes" (color insert), January, 1939.

Bulletin No. 2, November 10, 1941.

Photograph by William Summers

AN "OIL TOWN" IN THE JUNGLE MAY BE BUILT OF MUD AND BRANCHES

Building materials and tools are at a premium in such a jungle clearing as Quiriquire in eastern Venezuela, to which they would have to be transported over miles of unpaved road and the seasonally flooded rivers of the Orinoco valley. Homes for workmen are built of mud daubed on a crude framework of wooden posts and boughs. The scaffolding and ladder are also of the rough wood locally obtainable. Whitewash inside and out will complete the dwelling. The earth is the floor; corrugated iron makes the roof. Homes of officials are of brick.

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Strategic Materials (No. 10): Coconut Waste That Saves Lives

APRIL 22, 1915, has gone down in World War history as a black day. French soldiers in the Languemarck sector were slain by a silent, creeping, ghostlike adversary against which they had no defense, and a new chapter in the cruel history of human warfare began. That was the first successful poison gas attack.

Some of the soldiers muffled their faces with wet cloths. Some, breathing through their mouths, tried to filter the gas from the air by gags made of moist earth wrapped in handkerchiefs. Others tried breathing through broken bottles containing moist earth. Most of them were casualties.

About a third of the American casualties were caused by poison gas. Of these, two per cent died.

The thing that could best have saved their lives was up in a palm tree thousands of miles from the battlefront—the hard shell of the coconut (see illustration, inside cover). Having learned then the value of coconut shell charcoal for gas masks, the United States has been classifying it as a strategic material.

A Substitute Will Be Ready by Next Year

Because civilians as well as soldiers require gas masks, Uncle Sam's defense efforts need more coconut shells than the entire Western Hemisphere produces. In the World War, tons of shell were bought up in the Philippines and the Far East, where natives had been throwing it away or burning it as a fuel in the process of drying copra (the meat of the coconut). Now, to relieve the nation from depending on supplies from abroad, factories are being constructed which will soon be making gas mask charcoal by a secret process from a domestic material plentiful in the United States, and coconut shells by next New Year's Day will be the first "has-been" on the present list of strategic materials difficult to obtain.

In the first frantic efforts to make a mask for protection against poison gas, English women wrapped black veiling around wads of chemically treated absorbent cotton, to be moistened and tied over the wearer's mouth and nose. Another form consisted of a chemically treated flannel bag to cover the entire head, with an eye-window of mica. Then chemists recalled that charcoal was an effective filter; Lowitz in the 18th century had discovered that charcoal could filter out coloring matter and used it in refining sugar to a palatable whiteness. The French chemist Violette, while experimenting with gunpowder, accidentally learned that charcoal made at high temperatures was especially effective. Two Scottish professors, Dewar and Tait, proved that it could absorb gases as well as coloring matter. A Chicago professor in 1917 suggested that coconut shell charcoal, for the least

Strategic materials, according to the official definition of the Army and Navy Munitions Board, are "those essential to national defense, for the supply of which, in war, dependence must be placed in whole, or in substantial part, on sources outside the continental limits of the United States; and for which strict conservation and distribution control measures will be necessary."

The GEOGRAPHIC SCHOOL BULLETINS have been presenting a series of articles on these materials, their use, their peculiar qualities, and the countries from which they are obtained. The following have already been described:

Antimony (No. 9)	Mercury (No. 5)	Quinine (No. 2)
Chromium (No. 7)	Mica (No. 6)	Silk (No. 8)
Manila Fiber (No. 4)	Nickel (No. 1)	Tungsten (No. 3)

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More than 40 years ago, Churchill in *The River War* wrote of the great potential value of modern irrigation, since put into effect: "The wealth of Egypt depends on water. . . . There is a mighty volume of water and a vast expanse of desert. To join the two in fruitful union is the function of the dams; the greater the scale of irrigation, the greater the increase of wealth."

Practically all of Egypt's 16,000,000 people live by the side of the Nile. In the delta, population density is 1,500 persons to each square mile. There some of the world's best types of cotton, the major crop, are produced. Grains, sugar cane, dates, vegetables, and rice also grow luxuriantly. As a result of the perennial irrigation, two, sometimes three, crops are harvested.

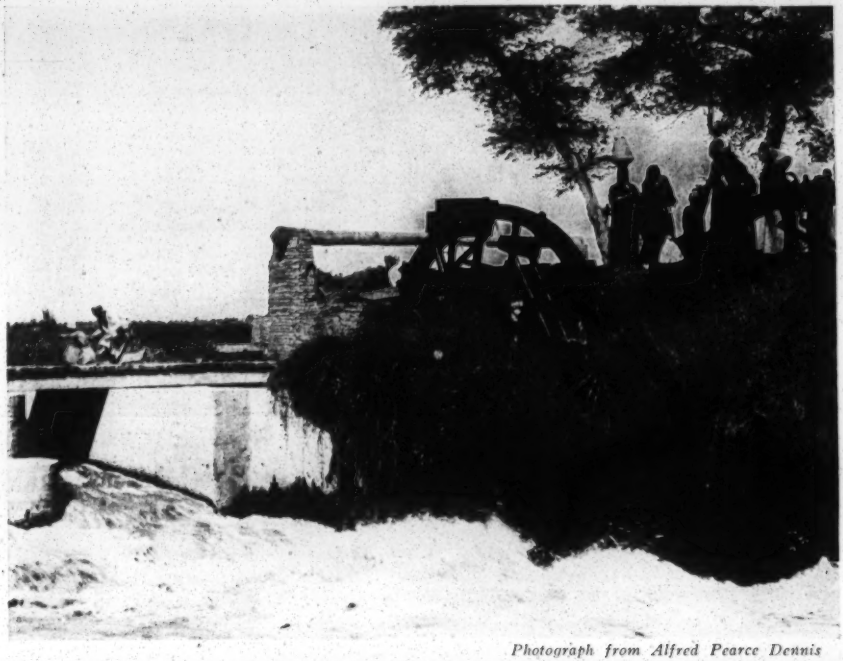
Note: The October, 1941, issue of the *National Geographic Magazine* carries 32 color reproductions of paintings by H. M. Herget in connection with the article, "Daily Life in Ancient Egypt." These paintings, along with 34 black and white illustrations, depict the daily life, culture, and history of the Egyptians, including dress, methods of warfare, and other customs.

The National Geographic Society's Map of Central Europe and the Mediterranean shows the Nile Delta in relation to the Mediterranean lands. A price list for this and other maps of the Society may be obtained from the Washington, D. C., headquarters.

Other articles on Egypt contained in the *National Geographic Magazine* include: "By Felucca Down the Nile," April, 1940; "The Suez Canal: Short Cut to Empires," November, 1935; and "Along the Banks of the Colorful Nile," September, 1926.

See also the following articles in the GEOGRAPHIC SCHOOL BULLETINS: "Suez Clinches Egypt's 2000-Year Tie to European Politics," October 14, 1940; "Egypt's Fortified Backdoor Opens on Italian Libia," April 1, 1940; "Marmarica, Italo-British Battlefield Where Sahara Meets Sea," January 6, 1941; "Egypt Lets Freedom Ring," December 7, 1936.

Bulletin No. 3, November 10, 1941.



Photograph from Alfred Pearce Dennis

"GO" SIGNS FOR DELTA IRRIGATION ARE "STOP" SIGNS FOR VEHICLES

Irrigation canals filled from the Nile help make the Nile Delta "the worst ground in the world for armored vehicles." Water in Egypt's life-line river, raised above ground level by the Nile Barrage north of Cairo, gushes through sluiceways into canals that carry fertility to fields on the edge of the desert. Though Cairo has street cars and radio stations, the country folk in the delta to the north live in almost Biblical simplicity. Women carry earthenware water jars on their heads much as their ancestors did in the days of Moses and the Pharaohs. A curious child leaning over to watch the water (left) is held by an anxious father.

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Mines Added to Natural Dangers of Australia's Great Barrier Reef

LONG a menace to ships because of its jutting coral formation, Great Barrier Reef off Australia's northeast coast is to become more menacing through the addition of mines planted by the British Navy.

Paralleling the coast 20 to 80 miles offshore, Great Barrier is the largest coral reef in the world (map, next page).

This series of natural coral-built breakwaters on one side and the mainland on the other form a sheltered "Grand Canal" a thousand miles long. It is one of the world's popular yachting courses.

Rich Sea Resources

The scattered islands and atolls of the reef are rich in phosphates and lime. The shallow waters abound with oysters, clams, turtles, sponges, and brilliantly colored fish. Vast stores of pearl shell have lured small craft to destruction.

There are a number of passages for ships through this coral barrier, but most of them are difficult to navigate. The currents often are uncertain. Haze frequently obscures the reefs, whose appearance changes greatly with the tides. One channel is significantly named Wreck Bay.

The well-wooded islands form bases for lighthouses and serve the Australians as picnic grounds amid tropical fruit trees and palm forests. They are generally easy to reach across the "canal" except in times of heavy winds. Many of the islands are relatively high; in the north, Lizard Island rises more than a thousand feet. Even in placid weather the waves break high on the outer barrier of the reefs.

On Turtle Island a popular sport is to ride the giant green turtles, which grow to a length of five feet. One of the early canned soup factories, located on one of the islands, turned out as many as 36,000 cans of turtle soup in a year.

Paradise for Naturalists

While navigators give the Great Barrier wide berth, it is an alluring haven for fishermen and naturalists. The warm waters support marine life as oversized and luxuriant as the tropical vegetation on the islands. Spanish mackerel range from 60 to 100 pounds and more. Clams grow to be the largest shellfish in the world (illustration, cover).

Along the reefs are found sea slugs, prized as a delicacy by the Chinese. Star fish there weigh several pounds. Giant clams may weigh as much as 500 pounds. Dugongs, or "sea cows," which are sea-dwelling mammals, reach a length of nine feet and may weigh half a ton. Devil rays may be 15 feet in width from tip to tip of their "wings," and weigh a ton.

The reef is covered with millions of sea birds in the spring, including various kinds of terns and shearwaters or mutton birds.

Note: The National Geographic Society's Map of the Pacific Ocean shows Australia, with the Great Barrier Reef. Insets of the islands of the Pacific make this map a valuable addition to the schoolroom. A price list for this and other maps may be obtained from the Society's headquarters in Washington, D. C.

Further discussion of the Great Barrier Reef and more information on Australia may be found in these *National Geographic Magazine* articles: "Fantastic Dwellers on the Great Barrier Reef," June, 1940; "The Great Barrier Reef and Its Isles," September, 1930; "Beyond Australia's Cities," December, 1936; and "Capital Cities of Australia," December, 1935.

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space and weight, would absorb the largest amount of poison gas (200 times its own volume), and this material was promptly adopted for U. S. gas masks. It was more effective than the wood charcoal used in Germany's leather gas masks, and it also weighed less—an important factor in all equipment a soldier must carry.

To supplement the country's World War supply of coconut shells, the United States had an "Eat More Coconut" campaign. Everyone saved peach pits and black walnut shells because they also made good charcoal.

Coconut shell "char" purifies air faster than a man breathes (some 90 to 100 quarts a minute). When prepared by burning with very little air at 900 degrees Centigrade, its ability to absorb gases—or to *adsorb* them, technically speaking—is six times greater than when burned at normal heat. Charcoal made more active by this process is called "activated." In a fraction of a second it can reduce the poison gas in air from 7,000 parts per million to one-half part.

The typical gas mask canister contains several alternating layers of small particles of the activated charcoal and soda lime, separated by light wire screens and filters of absorbent cotton and cotton toweling or flannel, held in place by springs.

For this grim use, coconut shells have been obtained as a by-product of the copra industry of the Philippines, other Pacific islands, and the Far East. The coconut palm grows abundantly in the coastal area of all sub-tropical and tropical regions of the world, for to flourish it needs only the hot sun over its head and the salt of sea water around its roots, but the industry developed where labor is cheap.

Bulletin No. 4, November 10, 1941.

Staff Photographer B. Anthony Stewart

THE GAS MASK HAS TO BE A PORTABLE CHEMICAL PLANT FOR MAN AND BEAST

Animals on front-line duty as well as men need "air-conditioners" for their breathing, so special masks have been invented for dogs, complete with eyepieces and ear pockets. The cavalry horse, even more important, gets a mask and special rubber boots. Early gas masks for soldiers resembled the simple, chemically treated cheesecloth masks now used for animals. The modern "dog-faced" mask for a man contains a miniature chemical factory in the life-saving canister protruding from the rubber facepiece. The chief ingredient is charcoal made from coconut shells, which "dry-cleans" from the air even deadly garlic-smelling "mustard" gas.

THE GREAT BARRIER REEF GIVES AUSTRALIA A SEA-WALL OF NATURAL WONDERS

Tiny Polyps Build 80,000 Square Miles of Coral Wonderworld

Infinite numbers of minute marine animals, called polyps, built and are still building the Great Barrier Reef. To date, they have covered an area twice that of the State of Ohio. The reef's multiplicity of low-lying islands and partly submerged bars, extremely hazardous to navigation, is a series of teeming tenements occupied by an amazing variety of fish and plant life. Through uncharted channels, from one end of the reef to the other, Captain James Cook miraculously navigated H. M. S. *Endeavour* in 1770. The quotations on the map are from the quaintly worded journal of this voyage. Now well charted, the Barrier's danger spots are marked by buoys and lights.

By N. B. and R. E. McA.